# High Purity GaAs Far IR Photoconductor With Enhanced Quantum Efficieny, Phase I

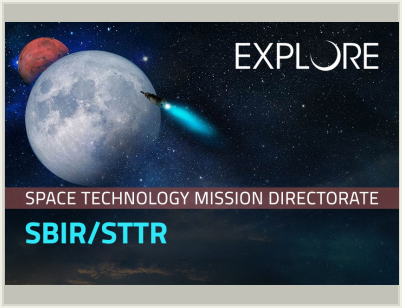
Completed Technology Project (2005 - 2005)

## Project Introduction

This proposal introduces an innovative concept aimed to significantly enhance the quantum efficiency of a far-infrared GaAs photoconductor and achieve sensitivity levels of 10E-18 W/SQRT(Hz) or better. We propose to employ a microwave source to assist the photoionization process by pumping the infrared-generated electrons from the excited states to the continuum. Since the microwave photons are low in energy, they are not available to directly ionize the ground state of the shallow donors. Therefore, the microwave pumping process is not expected to generate additional leakage current and the associated noise. This will allow us to cool the detector as low as necessary to reduce the thermal leakage current and improve the detector's noise performance. GaAs covers the 100-310?m spectrum where no other photodetector operates, it can be fabricated in large arrays, and is compatible with the established silicon readout technology. The proposed concept can be applied in a broader scope to other photodetectors, such as Ge:Ga, to exploit their excited state photoconductivity and extend their long wavelength response. This effort fits well within the scope of the SBIR Subtopic S2.01 and will be a benefit to many large and small NASA projects such as SOFIA and SAFIR.

## Anticipated Benefits

Aerospace industry: In addition to the aerospace companies that are under contract to NASA and directly participate in the space program, there are those that independently manufacture infrared detector arrays in large formats. Some aerospace companies that would be interested in our product are Raytheon Vision Systems, Boeing, Rockwell, and Ball Aerospace. Science groups at universities and national labs: Astronomical science instruments for observations at ground-based observatories and instruments for basic research. Space instruments developed under Origins Program such as SAFIR, science instruments for SOFIA, upcoming projects under Astrobiology Program, balloon-borne instruments for atmospheric research, and laboratory science instruments.

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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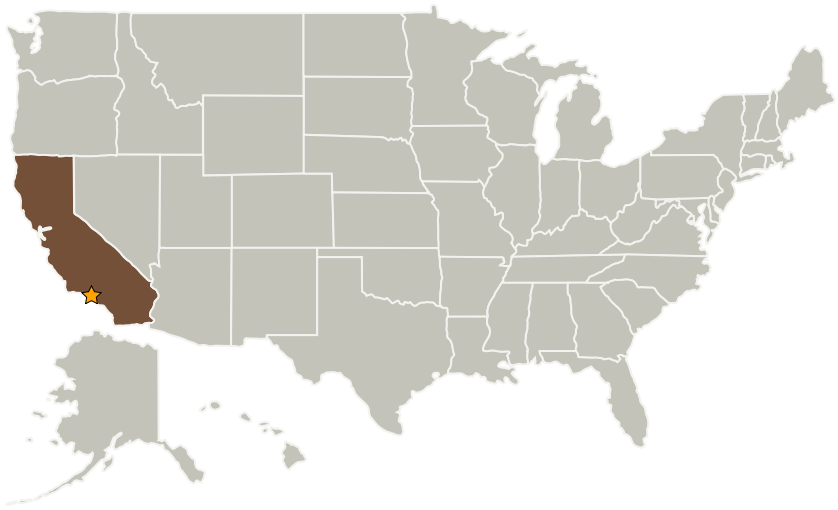
## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Jet Propulsion Laboratory(JPL) | Lead Organization | NASA Center | Pasadena, California |
| TechnoScience Corporation | Supporting Organization | Industry | Palo Alto, California |

| Primary U.S. Work Locations |
|---|
| California |

## Project Management

**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Project Manager:**
Celestino Jun Rosca

**Principal Investigator:**
Jam Farhoomand

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes